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ABSTRACT

This document summarizes the Third International Mathematics and Science Study (TIMSS) 1999 Video Study that is the follow-up and expansion of the TIMSS 1995 Video Study of mathematics teaching. The 1999 study investigated 8th grade mathematics as well as science. This report focuses on the mathematics lessons major findings and comparison of teaching across countries. (KHR)

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Highlights From the TIMSS 1999 Video Study of Eighth-Grade Mathematics Teaching

The Third International Mathematics and Science Study (TIMSS) 1999 Video Study is a follow-up and expansion of the TIMSS 1995 Video Study of mathematics teaching. Larger and more ambitious than the first, the 1999 study investigated eighth-grade science as well as mathematics, expanded the number of countries from three to seven, and included more countries with relatively high achievement on TIMSS assessments in comparison to the United States.

The countries participating in the mathematics portion of the TIMSS 1999 Video Study included Australia, the Czech Republic, Hong Kong SAR,[1] Japan, the Netherlands, Switzerland, and the United States. The TIMSS 1995 and 1999 average mathematics scores for these countries are displayed in table 1. On the TIMSS 1995 mathematics assessment, eighth-graders as a group in Japan and Hong Kong SAR were among the highest achieving students while eighth-grade students in the United States scored, on average, significantly lower than their peers in the other six countries. This report focuses only on the mathematics lessons; the report on science lessons will be released at a later date.

[1]For convenience, Hong Kong SAR is referred to as a country. Hong Kong is a Special Administrative Region (SAR) of the People's Republic of China.

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TABLE 1. Average scores on TIMSS 1995 and TIMSS 1999 mathematics assessments of countries participating in the TIMSS 1999 Video Study

Country	Average scores	
	1995[1]	1999[2]
Australia[3] (AU)	519	525
Czech Republic (CZ)	546	520
Hong Kong SAR (HK)	569	582
Japan (JP)	581	579
Netherlands[3] (NL)	529	540
Switzerland (SW)	534	—
United States (US)	492	502
International average[4]	—	487

— Not available.
[1]TIMSS 1995: AU>US; HK, JP>AU, NL, SW, US; JP>CZ, CZ, SW>AU, US; NL>US.
[2]TIMSS 1999: AU, NL>US; HK, JP>AU, CZ, NL, US.
[3]Nation did not meet international sampling and/or other guidelines in 1995. See Beaton et al. (1996) for details.
[4]International average: AU, CZ, HK, JP, NL, US>international average.
NOTE: Rescaled TIMSS 1995 mathematics scores are reported here. Due to rescaling of 1995 data, international average not available. Switzerland did not participate in the TIMSS 1999 assessment.
SOURCE: Gonzales, P., Calsyn, C., Jocelyn, L., Mak, K., Kastberg, D., Arafeh, S., Williams, T., and Tsen, W. (2000). *Pursuing Excellence: Comparisons of International Eighth-Grade Mathematics and Science Achievement From a U.S. Perspective, 1995 and 1999* (NCES 2001-028). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Release of the TIMSS 1995 Video Study results garnered attention from those interested in teaching and learning. In part, this attention was due to both the novel methodology, in which national samples of teachers were videotaped teaching an eighth-grade mathematics lesson in their regular classrooms, and the differences in teaching among the countries. Three countries participated in the 1995 Video Study—Germany, Japan, and the United States—and comparisons of the results suggested that each country had a distinct cultural pattern of teaching mathematics. Discussion of results from the 1995 Video Study can be found in Stigler et al. (1999) and Stigler and Hiebert (1999).

In many ways, the TIMSS 1999 Video Study of eighth-grade mathematics lessons begins where the 1995 study ended. Some findings address lingering questions that could not be answered in the first study or questions that have emerged over time as many audiences have interpreted the results. Other findings address new questions arising from advances in the field and from advances in the research methodology used in the study—the "video survey."

The mathematics portion of the TIMSS 1999 Video Study included 638 eighth-grade lessons collected from all seven participating countries. This includes eighth-grade mathematics lessons collected in Japan in 1995 as part of the earlier study.[2] In each country, the lessons were randomly selected to be representative of eighth-grade mathematics lessons overall. In each case, a teacher was videotaped for one complete lesson, and in each country, videotapes were collected across the school year to try to capture the range of topics and activities that can take place throughout an entire school year. Finally, to obtain reliable comparisons among the participating nations, the data were appropriately weighted to account for sampling design. Sampling and participation rate information, as well as

[2]Japan agreed to collect new data for the science component of the video study. Therefore, the Japanese mathematics lessons collected for the TIMSS 1995 Video Study were re-examined following the revised and expanded coding scheme developed for the 1999 study.

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other technical notes, are detailed in an appendix to the report *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study*, from which this highlights summary is drawn (Hiebert et al. 2003). For more detailed discussion of the technical aspects of the study, see the technical report (Jacobs et al. forthcoming).

What Can Be Learned From a Video Survey of Teaching Across Cultures?

Classroom teaching is a nearly universal activity designed intentionally to help young people learn. It is the process that brings the curriculum into contact with the students and through which national, regional, or state education goals are to be achieved. It is reasonable to assume that teachers and teaching make a difference in students' learning. However, methodically studying the direct effects that teachers and teaching may have on student learning is difficult, though not impossible. The TIMSS 1999 Video Study is based on the premise that the more educators and researchers can learn about teaching as it is actually practiced, the more effectively educators can identify factors that might enhance student learning opportunities and, by extension, student achievement. By providing rich descriptions of what actually takes place in mathematics and science classrooms, the video study can contribute to further research into features of teaching that most influence students' learning.

Comparing teaching across cultures has additional advantages.

- Comparing teaching across cultures allows educators to examine their own teaching practices from a fresh perspective by widening the known possibilities. In addition to examining how teachers across one's own country approach mathematics, opening up the lens to include an examination of how teachers in another country approach the same topic can make one's own teaching practices more visible by contrast and therefore more open for reflection and improvement.

- Comparing teaching across cultures can reveal alternatives and stimulate discussion about the choices being made within a country. Although a variety of teaching practices can be found in a single country, it sometimes requires looking outside one's own culture to see something new and different. These observations, combined with carefully crafted follow-up research, can stimulate debate about the approaches that may make the most sense for achieving the learning goals defined within a country.

Using national video surveys to study teaching has special advantages.

- Video enables detailed examination of complex activities from different points of view. Video preserves classroom activity so it can be slowed down and viewed multiple times, by many people with different kinds of expertise, making possible detailed descriptions of many classroom lessons.

- Collecting a random national sample provides information about students' experiences across a range of conditions, rather than exceptional experiences only. The ability to generalize nationally can elevate policy discussions beyond the anecdotal. Therefore it is important to know what actual teaching looks like, on average, so that national discussions can focus on what most students experience.

What Are the Major Findings From the TIMSS 1999 Video Study of Eighth-Grade Mathematics Teaching?

Based on the coding and analysis of the eighth-grade mathematics lessons videotaped for this study, the following points can be made.

➢ *Eighth-grade mathematics teaching in all seven countries shared some general features.*

The comparative nature of this study tends to draw attention to the ways in which the seven countries differed in the teaching of eighth-grade mathematics. But it is important to remember that both differences and similarities are expected in cross-country and cross-cultural comparisons. When a wide-angle lens is employed across countries, it is clear that all seven countries shared common ways of teaching eighth-grade mathematics. Viewed from this perspective, some similarities are striking.

- In all of the countries, eighth-grade mathematics was often taught through solving problems; at least 80 percent of lesson time, on average, was devoted to solving mathematics problems.
- Eighth-grade mathematics lessons in all seven countries were organized to include some public, whole-class work and some private, individual or small-group work. During the time that students worked privately, the most common pattern across the countries was for students to work individually, rather than in pairs or groups.
- On average, lessons in all of the countries included some review of previous content as well as some attention to new content.
- At least 90 percent of lessons in all the countries made use of a textbook or worksheet of some kind.
- Teachers in all of the countries talked more than students, at a ratio of at least 8:1 words, respectively.

➢ *While there were some shared general features, there was discernible variation across the countries in teaching eighth-grade mathematics. Distinctions included the introduction of new content, the coherence across mathematical problems and within their presentation, the topics covered and the procedural complexity of the mathematical problems, and classroom practices regarding individual student work and homework in class.*

A sample of these findings is summarized below.

- Eighth-grade mathematics lessons in the Czech Republic placed a greater emphasis on reviewing previously learned content than those in all of the other countries except the United States; lessons in Japan placed a greater emphasis on introducing new content than those in all six of the other countries; and lessons in Hong Kong SAR placed a greater emphasis on practicing new content than those in the Czech Republic, Japan, and Switzerland (figure 1).

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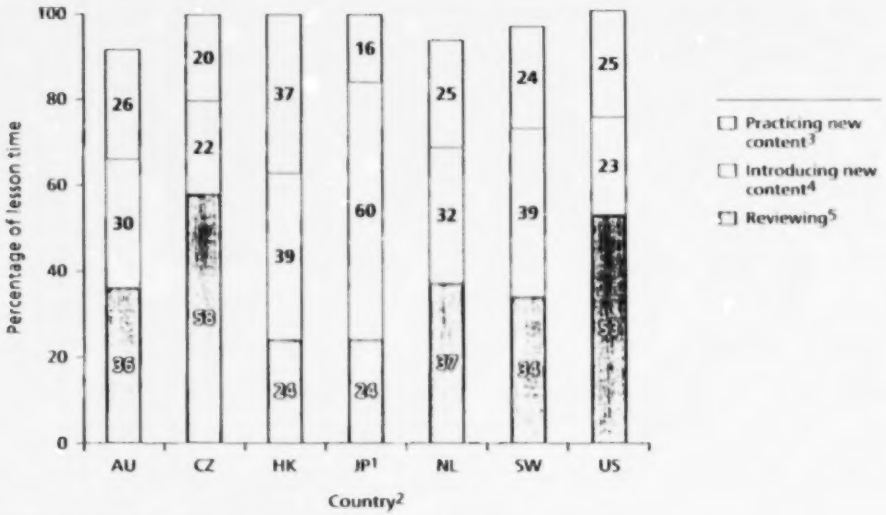
FIGURE 1. **Average percentage of eighth-grade mathematics lesson time devoted to various purposes, by country: 1999**



[1]Japanese mathematics data were collected in 1995.
[2]AU=Australia; CZ=Czech Republic; HK=Hong Kong SAR; JP=Japan; NL=Netherlands; SW=Switzerland; and US=United States.
[3]Practicing new content: HK>CZ, JP, SW.
[4]Introducing new content: HK, SW>CZ, US; JP>AU, CZ, HK, NL, SW, US.
[5]Reviewing: CZ>AU, HK, JP, NL, SW; US>HK, JP.
NOTE: For each country, average percentage was calculated as the sum of the percentage within each lesson, divided by the number of lessons. Percentages may not sum to 100 because of rounding and the possibility of coding portions of lessons as "not able to make a judgment about the purpose."
SOURCE: U.S. Department of Education, National Center for Education Statistics, Third International Mathematics and Science Study (TIMSS), Video Study, 1999. (Originally published as figure 3.8 of the report from which this highlights summary is drawn, *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study* [NCES 2003-013]).

Although, on average, eighth-grade mathematics lessons in all of the countries included some time reviewing previous content and some time introducing and practicing new content, there were differences in emphases in each country. Combining the time spent on both introducing and practicing new material provides another way of detecting differences: Australia, Hong Kong SAR, Japan, the Netherlands, and Switzerland devoted more time, on average, to studying new content (ranging from 56 to 76 percent of lesson time) than reviewing previous content; the Czech Republic spent more time, on average, reviewing previous content (58 percent of lesson time) than studying new content; and in the United States there was no detectable difference between the average percent of lesson time devoted to reviewing previous content and studying new content (53 and 48 percent of lesson time, respectively). Moreover, while a single mathematics lesson could combine time spent reviewing and introducing and practicing new content, there were a number of lessons that were entirely devoted to just one of those purposes. In the Czech Republic and the United States, a greater percentage of eighth-grade mathematics lessons were spent entirely in review of content previously presented than in Hong Kong SAR and Japan (28 and 28 percent of lessons compared to 8 and 5 percent, respectively).

- Eighth-grade mathematics lessons across the seven countries focused on a range of topics, from whole numbers and fractions to solving linear equations and trigonometry.

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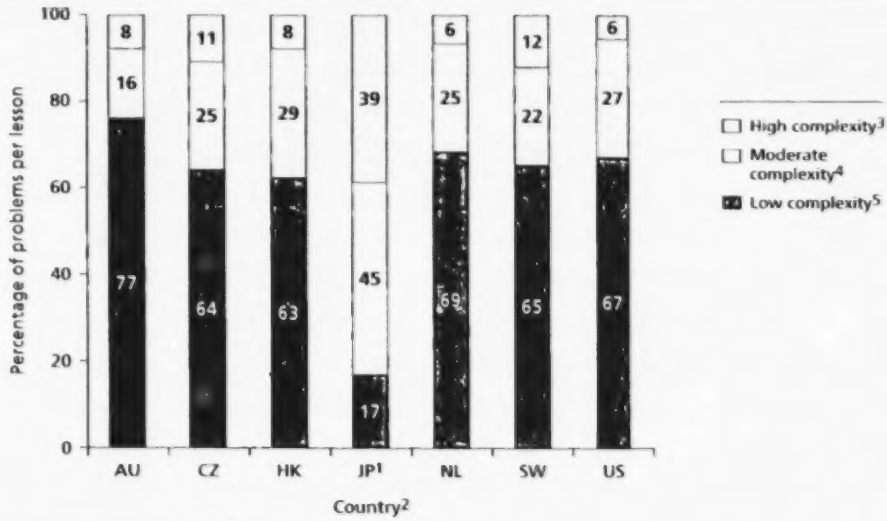
Among the almost 15,000 mathematics problems identified and examined as part of this study, at least 82 percent of the problems per lesson, on average, focused on three topic areas: number, geometry, and algebra. In one country, Hong Kong SAR, 14 percent of problems per lesson on average focused on trigonometry. In some lessons, all of the problems encountered by students focused on one topic or subtopic, such as linear equations, whereas in other lessons, the problems were identified as being from more than one subtopic or, even, across more than one topic (e.g., number and geometry). No single lesson is likely to include a range of problems related to all topics and subtopics typically covered in grade 8 mathematics.

- The level of procedural complexity of problems in Japanese eighth-grade mathematics lessons was different from that in the other countries (figure 2).

FIGURE 2. Average percentage of eighth-grade mathematics problems per lesson at each level of procedural complexity, by country: 1999



[1]Japanese mathematics data were collected in 1995.
[2]AU=Australia; CZ=Czech Republic; HK=Hong Kong SAR; JP=Japan; NL=Netherlands; SW=Switzerland; and US=United States.
[3]High complexity: JP>AU, CZ, HK, NL, SW, US.
[4]Moderate complexity: HK>AU; JP>AU, SW.
[5]Low complexity: AU, CZ, HK, NL, SW, US>JP.
NOTE: Percentages may not sum to 100 because of rounding. For each country, average percentage was calculated as the sum of the percentage within each lesson, divided by the number of lessons.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Third International Mathematics and Science Study (TIMSS), Video Study, 1999. (Originally published as figure 4.1 of the report from which this highlights summary is drawn, *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study* [NCES 2003-013]).

The overall complexity of the mathematics presented in the lessons is an important feature of the mathematics but is difficult to define and code reliably. This is due, in part, to the fact that the complexity of a problem needs to take into account the experience and capability of the student encountering the problem. What is complex to one student may be less complex to his or her classmate. One type of complexity that can be defined and examined independent of a student is procedural complexity: the number of steps it takes to solve a problem using a common solution method. Three levels of complexity were defined: low, moderate, and high. Low complexity was defined as a problem that required four or fewer

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decisions by a student to solve it, using conventional procedures. Moderate complexity was defined as a problem that, using conventional procedures, required more than four decisions by the student to solve it and could contain one sub-problem. High complexity was defined as a problem that required more than four decisions by a student, and at least two sub-problems, to solve it, using conventional procedures. Across the three levels of complexity, each of the countries, with the exception of Japan, included, on average, at least 63 percent of problems per lesson of low procedural complexity. At the other end of the scale, up to 12 percent of problems per lesson, on average, were of high procedural complexity, again with the exception of Japan. In Japan, 39 percent of problems per lesson were of high procedural complexity, a greater percentage than in any of the other six countries.

- The relationship between one mathematics problem and the next in an eighth-grade mathematics lesson was different in Japan from that in the other countries.

The relationship between the various mathematics problems presented in a lesson is of interest because the clarity and coherence of a lesson may be influenced, in part, by the way in which problems are related to each other. Four kinds of relationships between problems were identified: repetition, mathematically related, thematically related, and unrelated. Each problem presented in a lesson after the first problem was examined for the relationship to the prior problem. A problem was identified as a repetition if it was the same or mostly the same, requiring essentially similar operations to solve as the preceding problem in the lesson. A problem was identified as mathematically related if the problem used the solution to a previous problem for solving this problem, extended a previous problem by requiring additional operations, highlighted some operation of a previous problem by considering a simpler example, or elaborated a previous problem by solving a similar problem in a different way. Analysis of the data revealed that, on average, Japanese eighth-grade mathematics lessons contained a higher percentage of problems per lesson that were mathematically related (42 percent) than lessons in any of the other countries. Moreover, Japanese lessons contained a lower percentage of problems per lesson that were repetitions (40 percent) than those in any of the other countries. In all of the countries except Japan, at least 65 percent of the problems per lesson, on average, were identified as repetitions of the preceding problem.

- Teachers in Hong Kong SAR and Japan presented different types of mathematics problems to their eighth-grade classes than did teachers in the other countries (figure 3).

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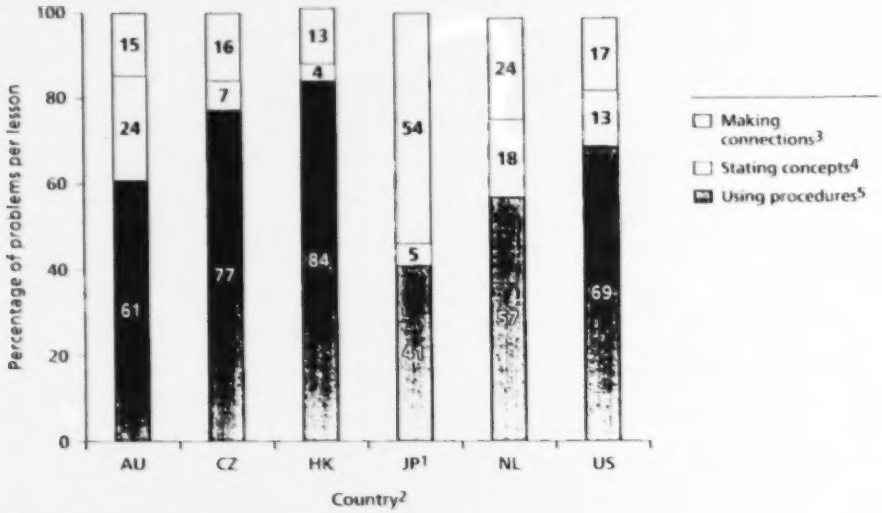
FIGURE 3. **Average percentage of problems per eighth-grade mathematics lesson of each problem statement type, by country: 1999**



[1]Japanese mathematics data were collected in 1995.
[2]AU=Australia; CZ=Czech Republic; HK=Hong Kong SAR; JP=Japan; NL=Netherlands; and US=United States.
[3]Making connections: JP>AU, CZ, HK, US.
[4]Stating concepts: AU>CZ, HK, JP, NL, US>HK, JP.
[5]Using procedures: CZ>JP, NL; HK>AU, JP, NL, US; US>JP.
NOTE: Analyses do not include answered-only problems (i.e., problems that were completed prior to the videotaped lesson and only their answers were shared). For each country, average percentage was calculated as the sum of the percentage within each lesson, divided by the number of lessons. English transcriptions of Swiss lessons were not available for mathematical processes analyses. Percentages may not sum to 100 because of rounding. The tests for significance take into account the standard error for the reported differences. Thus, a difference between averages of two countries may be significant while the same difference between two other countries may not be significant.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Third International Mathematics and Science Study (TIMSS), Video Study, 1999. (Originally published as figure 5.8 of the report from which this highlights summary is drawn, *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study* [NCES 2003-013]).

When mathematics problems were classified into three types of mathematical processes implied by the problem statement—using procedures, stating concepts, or making connections among mathematical facts, procedures, and concepts—lessons in Hong Kong SAR contained, on average, a larger percentage of problems per lesson targeted toward using procedures (84 percent) than the other countries in the figure, except the Czech Republic.[3] In the other countries, the range was from 41 to 77 percent of problems per lesson, on average. Mathematics teachers in Japan presented a larger percentage of problems per lesson that emphasized making connections (54 percent) than the other countries in the figure, except the Netherlands. In the other countries, the range was from 13 to 24 percent of problems per lesson, on average.

Using the same information in another way, an examination in each country of the relative emphases of the types of problems per lesson implied by the problem statements shows that in five of the six countries where data were available, a greater percentage of problems per lesson were presented as using procedures than either making connections or stating concepts. The exception to this pattern was Japan, where there was no detectable difference

[3]Switzerland was not included in the analyses of mathematical processes associated with mathematics problems.

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in the percentage of problems per lesson that were presented as using procedures compared to those presented as making connections.

- In Australian and U.S. eighth-grade mathematics lessons, a smaller percentage of making-connections problems were solved in a way that actually made the connections among mathematical facts, procedures, and concepts evident during classroom discussions than in the other countries.

For this analysis, problems were examined and coded twice: the first time according to the way they were stated at the outset, and the second time according to the way they were actually discussed in the eighth-grade mathematics classroom. This double-coding was necessary because problems can be initially stated in one form, and then transformed into a different form as they are discussed in the classroom. When problems initially stated as making connections were classified a second time based on the subsequent classroom discussion, mathematical connections or relationships were emphasized least often in the Australian and U.S. eighth-grade mathematics lessons among the six countries where data were available. In these two countries respectively, on average 8 percent and less than 1 percent[4] of problems per lesson that were initially stated as making connections led to classroom discussion of the problem that actually made the connections. The percentages in the other countries ranged from 37 to 52. Examination of problems that at the outset seemed designed to focus on using procedures revealed that mathematics problems in U.S. lessons were more likely to be followed through by actually using procedures than in either the Czech Republic or Japan.

- Eighth-grade mathematics lessons in Japan and the Czech Republic employed different methods to summarize the point of a lesson or a mathematical problem than those in almost all of the other countries.

Teachers may employ various techniques to help students recognize the key ideas in either a lesson or a particular mathematical problem or set of problems. One way that teachers can help students identify the key mathematical point of a lesson is to describe the goal of the lesson. To be included in the analysis, a goal statement about a specific mathematical topic to be covered during the lesson had to be explicitly written or said by the teacher. Across all seven countries, a higher percentage of eighth-grade mathematics lessons in the Czech Republic contained goal statements (91 percent) than in all the other countries except Japan. Dutch lessons included the fewest goal statements of any of the countries (21 percent).

A second way to help students recognize key ideas in a lesson is a summary statement at the end of a lesson. For all the countries, summary statements were less common than goal statements. Lesson summaries were identified in at least 21 percent of eighth-grade mathematics lessons in Japan, the Czech Republic, and Hong Kong SAR, and in 10 percent of lessons in Australia. In the other countries where reliable estimates could be calculated, between 2 and 6 percent of lessons included summary statements. After an individual mathematics problem has been solved, teachers might also summarize the points that the problem illustrates. On average, mathematics teachers in Japan summarized a higher percentage of problems per lesson (27 percent) than in any of the other countries.

[4]Rounds to zero.

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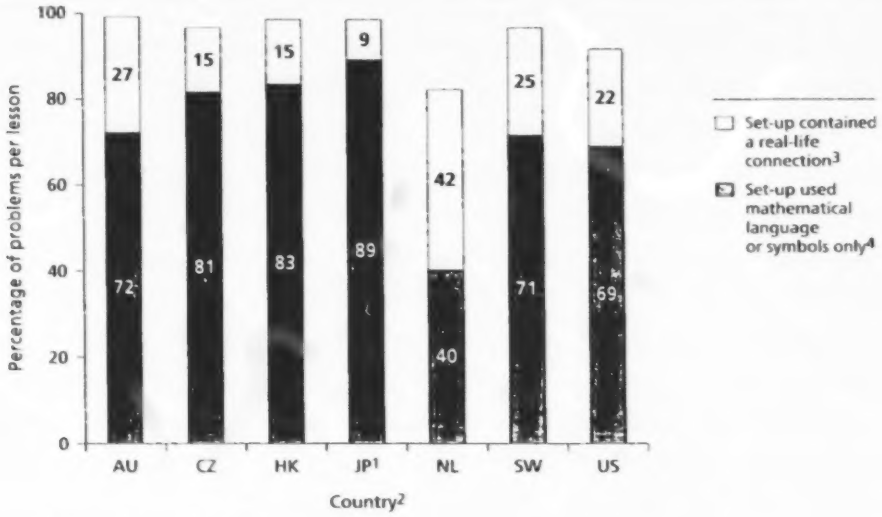
- Mathematics problems in eighth-grade lessons in the Netherlands emphasized the relationships between mathematics and real-life situations to a greater extent than those in most of the other countries (figure 4).

FIGURE 4. **Average percentage of problems per eighth-grade mathematics lesson that were either set up with the use of a real-life connection, or set up using mathematical language or symbols only, by country: 1999**



[1]Japanese mathematics data were collected in 1995.
[2]AU=Australia; CZ=Czech Republic; HK=Hong Kong SAR; JP=Japan; NL=Netherlands; SW=Switzerland; and US=United States.
[3]Set-up contained a real-life connection: AU, SW>JP; NL>CZ, HK, JP, US.
[4]Set-up used mathematical language or symbols only: AU, CZ, HK, JP, SW, US>NL; JP>AU, SW, US.
NOTE: Percentages may not sum to 100 because some problems were marked as "unknown" and are not included here. For each country, average percentage was calculated as the sum of the percentage within each lesson, divided by the number of lessons.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Third International Mathematics and Science Study (TIMSS), Video Study, 1999. (Originally published as figure 5.1 of the report from which this highlights summary is drawn, *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study* [NCES 2003-013]).

Students in the Netherlands were more likely than their peers in four of the other six countries to encounter problems that included a real-life connection (that is, word problems or other presentations that place problems in the context of a real-life situation; 42 percent of problems, on average, per lesson). The mathematics problems teachers presented to their students in all of the other countries were more likely to use only mathematical language and symbols than the problems presented in Dutch mathematics lessons (69 to 89 percent of problems, on average, per lesson compared to 40 percent, respectively).

- Australian, Dutch, and Swiss eighth-grade mathematics lessons devoted more time, on average, to students working individually or in small groups than did lessons in the other four countries.

Eighth-graders in Australia, the Netherlands, and Switzerland spent a greater percentage of lesson time, on average, working individually or in small groups (rather than whole-class interaction) and working on mathematics problems assigned as a set than eighth-graders in the other four countries. Moreover, when eighth-graders in Australia and Switzerland were assigned mathematics problems to work on as a set, the problems were less likely to be

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presented and discussed publicly than in two of the four other countries; and these sets of mathematics problems were less likely to be presented and discussed publicly in the Netherlands compared to any of the other countries.

The emphasis on eighth-grade students working privately on mathematics problems was seen with particular consistency in the Netherlands. In addition to the private-work indicators cited above, students in the Netherlands were assigned a larger number of homework problems per lesson (10 problems), on average, than students in all the other countries except Australia. The range in the other countries was from less than 1[5] to 5 mathematics problems per lesson, on average. Based on estimates, Dutch students appear to have spent, on average, a greater amount of time during the lesson working on these problems (10 minutes) than did students in all the other countries (ranging from 1 to 4 minutes).

- Among the many resources that could be used in mathematics lessons, calculators were used in more lessons in the Netherlands than in the other countries, and computers were used in relatively few eighth-grade mathematics lessons across all the countries.

Eighth-grade Dutch students frequently used calculators for computation during their mathematics lessons. Calculators were used in 91 percent of lessons—a rate higher than in any of the other countries for which reliable estimates could be determined. Use of computational calculators in the other countries ranged from 31 to 56 percent of lessons, with too few cases in Japan to report a reliable estimate. Graphing calculators were rarely observed in the eighth-grade mathematics lessons, except in the United States where they were used in 6 percent of lessons. Computers were actually used, rather than simply present, in relatively few of the eighth-grade mathematics lessons across the countries. Nonetheless, they were incorporated into 9 percent of Japanese lessons, 5 percent of Hong Kong SAR lessons, 4 percent of Australian lessons, and 2 percent of Swiss lessons. In the other countries, computers were used too infrequently to produce reliable estimates.

➢ *A broad conclusion that can be drawn from these results is that no single method of teaching eighth-grade mathematics was observed in all the relatively higher achieving countries participating in this study.*

All the countries that participated in the TIMSS 1999 Video Study shared some general features of eighth-grade mathematics teaching. However, each country combined and emphasized instructional features in various ways, sometimes differently from all the other countries, and sometimes no differently from some countries. In the TIMSS 1995 Video Study, Japan appeared to have a distinctive way of teaching eighth-grade mathematics compared to the other two countries in the study (Stigler et al. 1999). One of the questions that prompted the 1999 study was whether countries with high achievement on international mathematics assessments such as TIMSS share a common method of teaching. Results from the 1999 study of eighth-grade mathematics teaching among seven countries revealed that, among the relatively high-achieving countries, a variety of methods were employed rather than a single, shared approach to the teaching of mathematics.

To learn more about the results of this study and view video clip examples on CD-ROM, see the information below about how to access the report *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study.*

[5]Rounds to zero.

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References

Beaton, A., Mullis, I.V.S., Martin, M.O., Gonzalez, E.J., Kelly, D.L., and Smith, T.A. (1996). *Mathematics Achievement in the Middle School Years: IEA's Third International Mathematics and Science Study.* Chestnut Hill, MA: Boston College.

Hiebert, J., Gallimore, R., Garnier, H., Givvin, K.B., Hollingsworth, H., Jacobs, J., Chiu, A.M.-Y., Wearne, D., Smith, M., Kersting, N., Manaster, A., Tseng, E., Etterbeek, W., Manaster, C., Gonzales, P., and Stigler, J. (2003). *Teaching Mathematics in Seven Countries: Results From the TIMSS 1999 Video Study* (NCES 2003-013). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Jacobs, J., Garnier, H., Gallimore, R., Hollingsworth, H., Givvin, K.B., Rust, K., Kawanaka, T., Smith, M., Wearne, D., Manaster, A., Etterbeek, W., Hiebert, J., and Stigler, J.W. (forthcoming). *TIMSS 1999 Video Study Technical Report: Volume 1: Mathematics Study.* U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Stigler, J.W., Gonzales, P., Kawanaka, T., Knoll, S., and Serrano, A. (1999). *The TIMSS Videotape Classroom Study: Methods and Findings From an Exploratory Research Project on Eighth-Grade Mathematics Instruction in Germany, Japan, and the United States.* (NCES 1999-074). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Stigler, J.W. and Hiebert, J. (1999). *The Teaching Gap: Best Ideas From the World's Teachers for Improving Education in the Classroom.* New York: Free Press.

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